

(b)(i) If a main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern, the maximum EIRP in a given direction shall be determined by the following formula:

$$\text{EIRP} = 33 \text{ dBW} + 10 \log(X/6) \text{ dBW} + 10 \log(360/\text{beamwidth}) \text{ dBW},$$
 where X is the channel width in MHz and $10 \log(360/\text{beamwidth}) \leq 6 \text{ dB}$.

(ii) Beamwidth is the total horizontal plane beamwidth of the individual transmitting antenna for the station or any sector measured at the half-power points.

(c) An increase in station EIRP, above currently-authorized or previously-proposed values, to the maximum values provided in paragraphs (a) and (b) of this section may be authorized, if the requested increase would not cause harmful interference to any authorized or previously-proposed, co-channel or adjacent channel station entitled to interference protection under the Commission's rules, or if an applicant demonstrates that:

(1) A station that must be protected from interference could compensate for interference by increasing its EIRP; and

(2) The interfered-with station may increase its own EIRP consistent with the rules and without causing harmful interference to any cochannel or adjacent channel main or booster station protected service area, response station hub or BTA/PSA, for which consent for the increased interference has not been obtained; and

(3) The applicant requesting authorization of an EIRP increase agrees to pay all expenses associated with the increase in EIRP by the interfered-with station.

(d) For television transmission if the authorized bandwidth is 4.0 MHz or more for the visual and accompanying aural signal, the peak power of the accompanying aural signal must not exceed 10 percent of the peak visual power of the transmitter. The Commission may order a reduction in aural signal power to diminish the potential for harmful interference.

(e) For main, booster and response stations utilizing digital emissions

with non-uniform power spectral density (*e.g.* unfiltered QPSK), the power measured within any 100 kHz resolution bandwidth within the 6 MHz channel occupied by the non-uniform emission cannot exceed the power permitted within any 100 kHz resolution bandwidth within the 6 MHz channel if it were occupied by an emission with uniform power spectral density, *i.e.*, if the maximum permissible power of a station utilizing a perfectly uniform power spectral density across a 6 MHz channel were 2000 watts EIRP, this would result in a maximum permissible power flux density for the station of $2000/60 = 33.3$ watts EIRP per 100 kHz bandwidth. If a non-uniform emission were substituted at the station, station power would still be limited to a maximum of 33.3 watts EIRP within any 100 kHz segment of the 6 MHz channel, irrespective of the fact that this would result in a total 6 MHz channel power of less than 2000 watts EIRP.

[64 FR 63732, Nov. 22, 1999]

§ 21.905 Emissions and bandwidth.

(a) A station transmitting a television signal shall not exceed a bandwidth of 6 MHz (for both visual signal and accompanying aural signal), and will normally employ vestigial sideband, amplitude modulation (C3F) for the visual signal, and frequency modulation (F3E) or (G3E) for the accompanying aural signal.

(b) Quadrature amplitude modulation (QAM), digital vestigial sideband modulation (VSB), quadrature phase shift key modulation (QPSK), code division multiple access (CDMA), and orthogonal frequency division multiplex (OFDM) emissions may be employed, subject to compliance with the policies set forth in the Declaratory Ruling and Order, 11 FCC Rcd 18839 (1996). Use of OFDM also is subject to the subsequent Declaratory Ruling and Order, DA 99-554 (Mass Med. Bur. rel. Mar. 19, 1999). Other digital emissions may be added to those authorized above, including emissions with non-uniform power spectral density, if the applicant provides information in accordance with the guidelines and procedures set forth in the Declaratory Ruling and Order

which clearly demonstrates the spectral occupancy and interference characteristics of the emission. The licensee may subchannelize its authorized bandwidth, provided that digital modulation is employed and the aggregate power does not exceed the authorized power for the channel, and may utilize all or a portion of its authorized bandwidth for MDS response stations authorized pursuant to § 21.909 of this part. The licensee may also, jointly with affected adjacent channel licensees, transmit utilizing bandwidth in excess of its authorized frequencies, provided that digital modulation is employed, all power spectral density requirements set forth in this part are met and the out-of-band emissions restrictions set forth in § 21.908 of this part are met at and beyond the edges of the channels employed. The wider channels thus created may be redivided to create narrower channels.

(c) Any licensee of a station in the 2150–2162 MHz or 2596–2644 MHz, 2650–2656 MHz, 2662–2668 MHz, or 2674–2680 MHz frequency bands, after notice and opportunity for hearing, may be required to use the frequency offset technique to avoid or to minimize harmful interference to another licensed station in the 2150–2162 MHz and 2596–2544 MHz, 2650–2656 MHz, 2662–2668 MHz, and 2674–2680 MHz frequency bands or to make other changes as provided in §§ 21.100, 21.107, 21.900, 21.901, 21.902, 21.904, 21.905(a), 21.905(b), 21.906, 21.907, and 21.908 of this part.

(d) Notwithstanding the above, any digital emission which complies with the out-of-band emission restrictions of § 21.908 of this part may be used in the following circumstances:

(1) At any MDS main or booster station transmitter which is located more than 160.94 km (100 miles) from the nearest boundary of all cochannel and adjacent channel ITFS and MDS protected service areas, including Basic Trading Areas and Partitioned Service Areas; and

(2) At all MDS response station transmitters within a response service area if all points along the response service area boundary line are more than 160.94 km (100 miles) from the nearest boundary of all cochannel and adjacent channel ITFS and MDS pro-

tected service areas, including Basic Trading Areas and Partitioned Service Areas; and

(3) At any MDS transmitter where all parties entitled by this part to interference protection from that transmitter have mutually consented to the use at that transmitter of such emissions.

[44 FR 60534, Oct. 19, 1979, as amended at 49 FR 48700, Dec. 14, 1984; 55 FR 46011, Oct. 31, 1990; 56 FR 57818, Nov. 14, 1991; 63 FR 65104, Nov. 25, 1998; 64 FR 4054, Jan. 27, 1999; 64 FR 63732, Nov. 22, 1999]

§ 21.906 Antennas.

(a) Main and booster station transmitting antennas shall be omnidirectional, except that a directional antenna with a main beam sufficiently broad to provide adequate service may be used either to avoid possible interference with other users in the frequency band, or to provide coverage more consistent with distribution of potential receiving points. In lieu of an omnidirectional antenna, a station may employ an array of directional antennas in order to reuse spectrum efficiently. When an applicant proposes to employ a directional antenna, or a licensee notifies the Commission pursuant to § 21.42 of the installation of a sectorized antenna system, the applicant shall provide the Commission with information regarding the orientation of the directional antenna(s), expressed in degree of azimuth, with respect to true north, and the make and model of such antenna(s).

(b) The use of horizontal or vertical plane wave polarization, or right hand or left hand rotating elliptical polarization may be used to minimize the hazard of harmful interference between systems.

(c) Transmitting antennas located within 56.3 kilometers (35 miles) of the Canadian border should be directed so as to minimize, to the extent that is practical, emissions toward the border.

(d) Directive receiving antennas shall be used at all points other than response station hubs and response stations operating with an EIRP no greater than –6 dBW per 6 MHz channel and shall be elevated no higher than necessary to assure adequate service. Receiving antenna height shall not exceed